BROOKHAVEN NATIONAL LABORATORY

Laboratory Link

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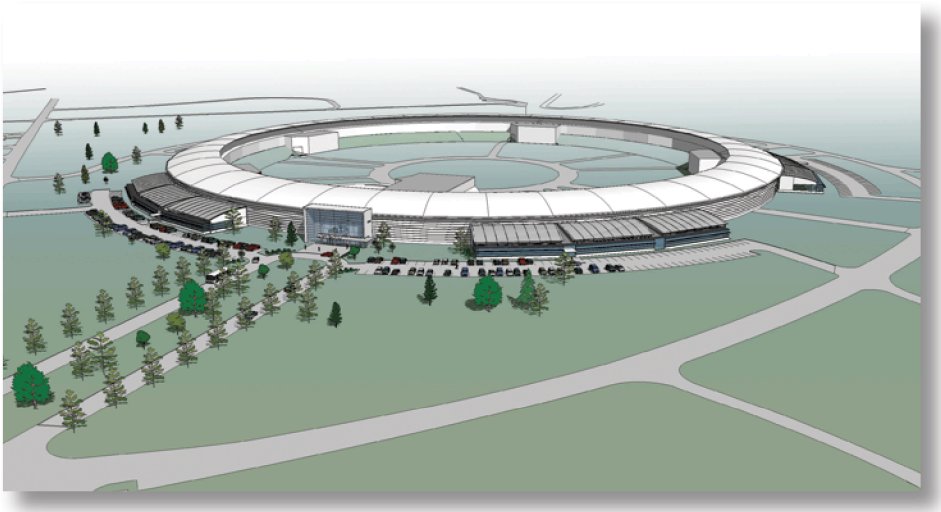
World's Newest 'Light Source' to Be Built at Brookhaven Lab; To Be Used in National Effort to Address U.S. Energy Challenges

Up to 200 Long Island jobs to be created during $750-925 million construction project

- Celebrating 60 years of scientific discovery in 2007, Brookhaven Lab this year received a second major anniversary present from our primary sponsor, the U.S. Department of Energy (DOE): On July 17th, DOE announced that, yes, the world's newest synchrotron light source—the National Synchrotron Light Source II—will be built at the Laboratory.
- "The place is here, the time is now," announced Patricia Dehmer, who head's the Office of Basic Energy Sciences which is funding the $750-925 million project.
- With construction beginning in 2009, NSLS-II will create up to 200 building-trades jobs. When NSLS-II operations begin in 2015, several hundred additional new positions will be added at the Laboratory.
- BNL's new light source is called NSLS-II because it will replace the Lab's current National Synchrotron Light Source (NSLS)—commissioned in the early 1980s as the first synchrotron light source in the world designed specifically for the experimental use of synchrotron light.
- A synchrotron light source is a specialized particle accelerator that circulates electrons at near light speed and high current for hours within the ultra-high vacuum of a closed ring.



On the map of Brookhaven Lab is a drawing of the National Synchrotron Light Source II, which will be the largest construction project in the 60-year history of the Laboratory

- While circulating within a synchrotron storage ring, electrons emit light—extremely powerful and super bright light that is called, of course, synchrotron light.
- Sent down beam lines attached to the storage ring, this light interacts with whatever physical material or biological specimen is placed within the experimental station at a beam line's end.
- The result: high-resolution images at the atomic or molecular level, showing details not seen before—information that, for instance, can then be used to improve the nature of a solid-state material or diagnose a medical condition.
- The NSLS-II has been designed to generate light 10,000 times brighter than our current light source for use in these research areas—to reveal even more information in resolving material and specimens to greater detail.
- NSLS-II complements the Lab's first major 60th-anniversary present from DOE: the completion of the Center for Functional Nanomaterials (CFN), which, as one of only five such DOE facilities in the nation, houses research exploring the structure and function of materials on the scale of a nanometer, or a billionth of a meter.
- To be fully operational in April 2008, the CFN is home to researchers seeking nanoscale-structured solutions to U.S. energy problems, many of whom, in developing new and improved materials—ones that are stronger, lighter, more reactive, more energy efficient, etc.—will utilize the NSLS-II.

BNL Scientists Among First to Observe 'Synchrotron' Light; Designers of World's Most Versatile 'Dedicated' Light Source

- Housing two of America's nine operating synchrotron light sources, the present National Synchrotron Light Source (NSLS) at Brookhaven Lab contains an ultraviolet light-emitting accelerator ring and one the emits x-rays—which, when commissioned in the early 1980s, were the world's first to be designed for dedicated, experimental use of "synchrotron light."

- An accelerator, such as a synchrotron, takes stationary charged particles, such as electrons, and, just as its name says, speeds them up to near light speed. In being forced to travel around a circular accelerator by magnets, charged particles lose energy in the form of emitted light — intense electromagnetic radiation known as synchrotron light.

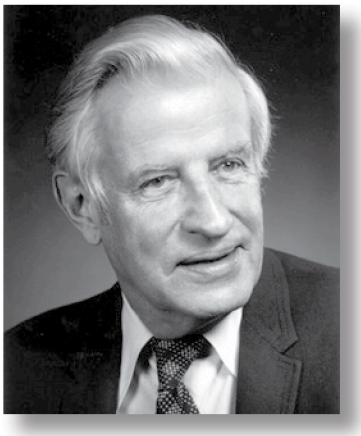
- Until the opening of the NSLS and other light sources, however, researchers who wanted to use synchrotron light to examine the structure and function of materials and specimens had to share the first-generation synchrotrons with physicists who used the electron beams to search for new particles and interactions of matter.

- Results of synchrotron-light experiments, however, convinced the U.S. Department of Energy (DOE) to build the NSLS as then the world's largest set of "second-generation" light sources, committed to producing synchrotron light to be used as a tool to look into everything — from the AIDs virus to zeolites.

- Over the past 25 years, discoveries at the NSLS—such as one that was awarded the 2003 Nobel Prize in Chemistry—persuaded DOE to approve the construction of the National Synchrotron Light Source II (NSLS-II).

- To be even bigger and better than the existing NSLS, the NSLS-II will be the highest brightness and flux, medium-energy, synchrotron-light source in the world. It is scheduled to start operating by 2015.

- With a 2009 building start date, the NSLS-II will also be the biggest construction project in the Lab's history.



The late John Blewett, pictured in 1978 upon his BNL retirement after 40-plus years of designing and building accelerators

Pictured in 1977 are the late designers of the National Synchrotron Light Source, Ken Green (left) and Renate Chasman, with fellow physicist Martin Blume (center). In the 1970s, Dr. Blume was instrumental in obtaining the funding, recruiting the users and developing the scientific program for the original NSLS. For these accomplishments, Dr. Blume was, in 1981, awarded one of DOE's highest awards, the $50,000 E.O. Lawrence Award. Today, he is former Editor-in-Chief of the American Physical Society and BNL Senior Physicist Emeritus.

- The records set by the NSLS and the ones soon to be set by the NSLS-II are not surprising: these and other technical firsts are following upon the groundbreaking research in the field of accelerator physics and light-source development performed by Laboratory scientists of the past and present.

- In fact, Brookhaven Lab staff have been researching synchrotron light and developing its sources since before synchrotron light was observed.

- The emission of light from a synchrotron was first indirectly observed in 1945 by the late physicist John Blewett, who at the time was a GE physicist. Dr. Blewett was also among those at GE to be the first directly to observe synchrotron light in 1947, the year he also joined BNL.

- The design of many of today's nearly 70 light sources is, also in fact, based on the layout of magnets devised by the two designers of the NSLS: the late physicists Renate Chasman and G. Kenneth Green, who passed away before the light from the NSLS was first turned on.

- The Chasman-Green design has had longevity: Not only is it the basis for the present NSLS, but it also lives on as a central feature of ten of the world's "third-generation" light sources — as well as the soon-to-be-built NSLS-II.